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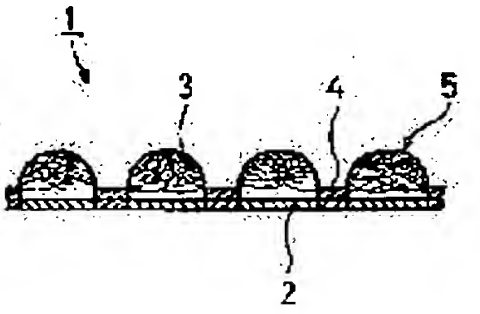
(54) NONWOVEN FABRIC HAVING UNEVENNESS ON ITS SURFACE AND FEMALE MEMBER OF SURFACE FASTENER, AND ITS PRODUCTION

(57)Abstract:

PURPOSE: To provide a nonwoven fabric and a female member of a surface fastener soft and high in fastening power and low in cost by forming the nonwoven fabric with at least 2 kinds of fibers consisting of a shrunk fiber layer and non shrinking fibers, unified partially in the thickness direction with heat melted adhesion parts, and by forming protruded parts of non shrinking fibers at the non heat melted adhesion parts respective by among the heat melted adhesion parts.



CONSTITUTION: This nonwoven fabric is produced by using staple fibers consisting of an ethylene-propylene random copolymer having 136°C melting point as heat shrinking fibers and forming a parallel web used as a first fiber layer 2, forming a parallel web used as a second fiber layer 3 of sheath core- type composite fibers of non shrinking fibers consisting of an ethylene-propylene random copolymer as a sheath component and a polypropylene as a core component, laminating the second fiber layer 3 over the first layer fiber 2, and heating by treating the laminated material with an emboss roll having dot like projections.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the suitable nonwoven fabric and suitable field fastener female material for disposable goods like field fastener female material, especially a disposable diaper which have irregularity on a front face, and its manufacture approach.

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PRIOR ART

[Description of the Prior Art] Usually, a field fastener consists of looping female material and female material which has the hook sections, such as a ** type which engages with female material, or a mushroom mold. Since a field fastener can be used simple, it is formed in the closing motion sections, such as garments, shoes, a bag, and daily necessaries, or the installation section of seat covering of a car, and is widely used in many fields. Moreover, recently, what stuck field fastener female material on the waist section of a diaper is proposed in order to make a disposable diaper fix or fix, and practical use is presented.
[0003] Generally as field fastener female material, the sheet which the loop formation formed from the monofilament and multifilament of synthetic resin projected from one side of woven knitted goods is used widely. Such female material has the very strong engagement force with female material, and the engagement force is useful in order not to decline to use of a repeat, either.
[0004] However, it is unsuitable to use [diaper / disposable] such female material. That is, it is because ** is high and generally lacks in flexibility, so the female material which has the structure which the above loop formations projected from woven knitted goods may give the wearer of a diaper sense of incongruity. Moreover, since the manufacturing cost of such female material generally attaches highly, it is not realistic to use such female material in the intense disposable goods of price competition, and it is more rational than the engagement force of a fastener to think the manufacturing cost as important rather.
[0005] Then, the field fastener which thought the manufacturing cost as important from the former has been proposed variously. For example, in JP,62-38105,A, the field fastener member which stitching was performed [member] on the nonwoven sheet and made the loop formation project on a nonwoven fabric sheet is proposed. Moreover, in JP,4-105602,A, it is indicated by inserting in a textile the multifilament line of thread which has a loop formation, a coil, etc. on a front face by fluid disturbance processing at a large number that it has sufficient engagement force and the field fastener female material which is not bulky can be obtained. Moreover, in JP,6-33359,A, the field fastener female material which consists of a continuous glass fiber nonwoven fabric which made many wrinkles form in a front face is indicated.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there are the following inconvenient points in these field fastener female material. For example, although it is satisfactory in respect of the engagement force, a manufacturing cost becomes high and the fastener member shown by JP,62-38105,A is still unsuitable for the intense disposable goods of price competition, in order to perform stitching to a nonwoven fabric. Although especially a problem similarly does not have what is indicated by JP,4-105602,A about exfoliation strength and tensile strength, since it is necessary to carry out weaving or more of one using specific multifilament, a manufacturing cost becomes high. Although the continuous glass fiber nonwoven fabric shown by JP,6-33359,A can be manufactured cheaply on the other hand and it is suitable for the so-called disposable goods, the engagement force with male material is weak, and when used for a diaper, there is a trouble of being easy to break away by motion of people.
[0007] In order that this invention may solve said conventional problem, it is flexible and aims to let the engagement force provide with the manufacture approach the nonwoven fabric which has irregularity on the front face suitable for the cheap high and field fastener female material of cost, and a field fastener female material list.

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EFFECT OF THE INVENTION

[Effect of the Invention] It is the nonwoven fabric which consists of at least two kinds of fiber which consists of contracted fiber layers and non-shrinkage-characteristics fiber according to the nonwoven fabric of this invention as explained above, and is the heat welding section partially. When it is unified in the thickness direction, and said non-shrinkage-characteristics fiber projects into a surface part and forms heights in the non-heat welding section between each heat welding section, it is flexible and the nonwoven fabric which has irregularity on the front face on which the engagement force was suitable for the cheap high and field fastener female material of cost can be realized.
[0048] Next, according to the field fastener female material of this invention, by using the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part as the engagement section with the hook section of field fastener male material using the nonwoven fabric which has irregularity on the surface of the above, it is flexible and the engagement force can realize the cheap high and field fastener female material of cost.
[0049] Next, according to the approach of this invention, said nonwoven fabric and field fastener female material can be manufactured rationally efficiently. The nonwoven fabric of this invention has detailed irregularity on a front face, and has structure which was very suitable for field fastener female material. And since the degree of freedom of fiber is bulky comparatively highly in the heights formed between each heat welding section, the nonwoven fabric of this invention is what was remarkably rich in flexibility compared with the field fastener female material currently used widely. So, when this is used for a disposable diaper etc., sense of incongruity is not given to a wearer. Furthermore, since it is obtained by processing the web by which the laminating was carried out using a hot calender roll, without passing through a complicated production process, the nonwoven fabric of this invention can be produced comparatively cheaply. Therefore, the nonwoven fabric of this invention can be especially used preferably as field fastener female material used for disposable goods, such as a diaper with which flexibility and low cost are demanded.

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MEANS

[Means for Solving the Problem] In order to attain said purpose, the nonwoven fabric which has irregularity on the surface of this invention The second fiber layer which contains non-shrinkage-characteristics fiber to one side or both sides containing the fiber which carried out the heat shrink of the first fiber layer is the nonwoven fabric which comes to carry out a laminating. It is characterized by for said second fiber layer projecting both the fiber layer into a surface part between each heat welding section by being partially unified in the thickness direction by the heat welding section, and forming heights.
[0009] In invention of said nonwoven fabric, the first fiber layer contains the fiber in which the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% carried out the heat shrink 50% of the weight or more. The second fiber layer consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts. And heat welding nature fiber is contained in one [at least] fiber layer of the first fiber layer or the second fiber layer 30% of the weight or more among the nonwoven fabric, and, as for both the fiber layer, it is desirable to carry out heat weld partially by said heat welding fiber.
[0010] Moreover, in invention of said nonwoven fabric, it is desirable that it is fiber which the fiber which constitutes the fiber layer which the first fiber layer contracted turns into from the polymer in which fusion peak temperature (Tmdegree C) contains the ethylene-propylene random copolymer of 130<Tm<145 70% of the weight or more.
[0011] Moreover, in invention of said nonwoven fabric, it is desirable that it is the sheath-core mold bicomponent fiber with which non-shrinkage-characteristics fiber has arranged the ethylene-propylene random copolymer for the sheath component, and has arranged the polyolefine component for the heart component.
[0012] Moreover, in invention of said nonwoven fabric, it is desirable that non-shrinkage-characteristics fiber is the staple fiber (staple fiber) of the range of the fineness of 1.5-10 deniers and 38-76mm fiber length.
[0013] Next, the field fastener female material of this invention is a nonwoven fabric which has irregularity on the front face of said configuration, and the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part are characterized by being the engagement section with the hook section of field fastener male material.
[0014] Next, the manufacture approach of a nonwoven fabric of having irregularity on the surface of this invention The first fiber layer contains the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% 50% of the weight or more. The second fiber layer consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts. And two fiber layers which heat welding nature fiber was made to be contained in one [at least] fiber layer of the first fiber layer or the second fiber layer 30% of the weight or more among the nonwoven fabric are prepared. By carrying out the laminating of the second fiber layer to one side or both sides of the first fiber layer, using an embossing roll for this, and performing heating pressure treatment at the temperature near the melting point of the above-mentioned heat shrink

nature fiber It is characterized by carrying out the heat shrink of said heat shrink nature fiber, and making heights form between each heat welding section of the second fiber layer at the same time it carries out heat welding of both the fiber layer partially.
[0015] Eyes 10-40g/m2 by which the second fiber layer was constituted from a staple fiber with a fineness [of 1.5-10 deniers], and a fiber length of 38-76mm in said approach It is desirable that it is a staple fiber web.
[0016] Moreover, it sets to said approach and the first fiber layer is the fiber length of 38-76mm and eyes 10 - 40 g/m2. It is desirable that it is the parallel web of the range. Moreover, it sets to said approach and the area of a top face is 2 0.35-1mm as an embossing roll. It is a small projection 1cm 2 Forming the nonwoven fabric whose per 10-100-piece area percentage of it being arranged and occupying on the nonwoven fabric front face of the heat welding section using ** is 10 - 50% explains the contents of this invention below good **.
[0017] The second fiber layer which consists of non-shrinkage-characteristics fiber which is not substantially contracted at the temperature in which the heat shrink nature fiber carries out a heat shrink to the first fiber layer containing heat shrink nature fiber carries out the laminating of this invention, and it is characterized by making the bulky heights which were suitable at engagement in the hook section of field fastener male material at the second fiber layer using the difference of both rate of a heat shrink form. Therefore, as for the heat shrink nature fiber which fully needs to carry out the heat shrink of the first fiber layer, and is contained in the first fiber layer, it is desirable for the rate of the maximum heat shrink to be at least 50%, and, as for the mixed rate, it is desirable that it is 50 % of the weight or more. The rate of the maximum heat shrink means the greatest thing in the rate of a heat shrink shown while the heated fiber had maintained the configuration of fiber here. When the rate of the maximum heat shrink uses less than 50% of heat shrink nature fiber, or when the rate of heat shrink nature fiber is less than 50 % of the weight, the heat shrink of the first fiber layer is inadequate, and the heights formed in the second fiber layer will become scarce at a loft, and will stop being able to engage with male material easily.
[0018] If heat shrink nature fiber is contained 50% of the weight or more, other fiber is mixable in the first fiber layer. especially the fiber to mix is limited -- not having -- the arbitration from polyolefin fibers, such as polyester fiber, such as polyamide fibers, such as semi-synthetic fibers, such as regenerated fibers, such as rayon, and acetate, nylon 6, and Nylon 66, polyethylene terephthalate, and polybutylene terephthalate, polyethylene, and polypropylene, etc. -- 1 -- or it can be used, choosing two or more. Of course, the first fiber layer may consist of only heat shrink nature fiber.
[0019] It is desirable to use the fiber which consists of a polymer which contains the ethylene-propylene random copolymer which has fusion peak temperature (Tmdegree C) within the limits of 130<Tm<145 degree C as heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% 70% of the weight or more by this invention. Fusion peak temperature means temperature in case a DSC curve shows re-**** here, when a differential scanning calorimeter (DSC) performs heat-of-fusion measurement of a polymer. A polymer comes to show rubber-elasticity that fusion peak temperature is less than 130 degrees C here, and the card permeability of fiber worsens. On the contrary, if it exceeds 145 degrees C, since the heat shrink nature of fiber becomes usual polypropylene extent, it is not desirable.
[0020] Although the modes of the first fiber layer may be any, such as a parallel web which consists of a staple fiber, a cross web, a semi random web, and a random web, heights are formed in the second fiber layer for the way which centralizes the direction of the heat shrink of a fiber web on an one direction at homogeneity. Therefore, as for the first fiber layer, it is desirable that it is a parallel web. In this case, when card permeability, the conditions of a web, etc. are taken into consideration, as for the fiber length of a staple fiber, it is desirable that it is 38-76mm. Moreover, at this invention, they are the eyes of the first fiber layer 10-40g/m2 Especially the thing to do is desirable and it is 10 g/m2. In the following, unevenness is made to a web, and in order not to carry out a heat shrink to homogeneity, heights serve as an ununiformity. on the contrary, eyes -- 40 g/m2 if large -- the thickness of the fiber web after a heat shrink -- large -- becoming -- the fastener whole -- ** -- it becomes high and is inferior to flexibility or

permeability.
[0021] As for the second fiber layer, much heights are formed in the front face of the heat shrink of the first fiber layer. Therefore, the fiber which constitutes the second fiber layer can form a fiber set object, and especially a material etc. will not be limited if it does not contract substantially in the temperature which heat shrink nature fiber contracts. for example, the arbitration out of polyamide fibers, such as polyester fiber, such as polyolefin fibers, such as natural fibers, such as semi-synthetic fibers, such as regenerated fibers, such as rayon, and acetate, cotton, and wool yarn, polypropylene, polyethylene, and polybutene, polyethylene terephthalate, and polybutylene terephthalate, nylon 6, and Nylon 66, -- 1 -- or it can be used, choosing two or more. A fiber configuration etc. is not limited but the fiber which has a division nature bicomponent fiber and a variant cross section can be used for arbitration.
[0022] Since heat welding of the first fiber layer and the second fiber layer is especially carried out partially by this invention, as for non-shrinkage-characteristics fiber, it is desirable for junction nature with the first fiber layer to be good fiber. For example, when using the fiber which consists of an ethylene-propylene random copolymer mentioned above as heat shrink nature fiber, a sheath-core mold bicomponent fiber with which an ethylene-propylene random copolymer occupies a fiber front face is good to use an assembled-die bicomponent fiber.
[0023] Although especially the mode of the second fiber layer is not limited, when engagement nature with the hook section of field fastener male material is taken into consideration, the so-called staple fiber webs, such as a parallel web which consists of a staple fiber, a cross web, a semi random web, and a random web, are desirable. In this case, as for fiber length, it is desirable that it is 38-76mm, and if it is less than 38mm, when it is easy to produce fuzz in heights, and it will be repeat-engaged and will exfoliate further, the problem that the engagement force of a fastener declines produces it. If fiber length exceeds 76mm, card permeability will worsen, and it becomes impossible moreover, to obtain the web in which conditions were ready. Moreover, as for the fineness of fiber, it is desirable that it is 1.5-10 deniers. If fineness is less than 1.5 deniers, it will be easy to go out by engagement in the hook section of male material, and exfoliation, will become the cause of fuzz, and will become the cause of an engagement force fall further. On the contrary, if fineness exceeds 10 deniers, the flexibility of the whole fastener is spoiled, by the web of these eyes, in order that the configuration fiber number per unit volume may decrease as fineness becomes large, the number of fiber which engages with the hook section of male material will decrease, and the engagement force will decline.
[0024] Since it is necessary to carry out heat welding of the first fiber layer and the second fiber layer partially and the nonwoven fabric of this invention needs to make them unify, it is [being contained 30% of the weight or more in the whole fiber from which heat welding nature fiber constitutes a nonwoven fabric at least in one side of both the fiber layer] desirable. If heat welding nature fiber is contained in both the first fiber layer and the second fiber layer, since between both fiber layers will be joined more firmly, it is more desirable. It is good to use what softens, or fuses and carries out heat weld in this invention at temperature lower than the contraction initiation temperature of heat shrink nature fiber. Moreover, this heat welding nature fiber can also be made to serve a double purpose for the heat shrink nature fiber mentioned above. For example, since it softens or fuses and heat welding nature is also shown at the same time it carries out a heat shrink by performing heating pressure treatment at 115-145 degrees C, the fiber which consists of an ethylene-propylene random copolymer illustrated previously can be used also as heat welding nature fiber.
[0025] The laminating of the above-mentioned first fiber layer and the second fiber layer is carried out, and heat welding is partially carried out, and they are unified. Heating and the approach of pressurizing are desirable, passing between an embossing roll and the flat rolls arranged in the lower part section as an approach of carrying out heat weld partially. The thing of a slit type with which irregularity with a top face circularly regular to the thing which has a gearing's configuration where regular irregularity was elsewhere formed crosswise [of a roll] although much polygonal small projections were arranged in the roll surface, or the lengthwise direction of a roll as an embossing roll is formed etc. can be used. Moreover, if the heat welding section is prepared regularly, since the heights formed between each heat welding section will also become regular, the beautiful nonwoven fabric which presents an orderly

appearance can be obtained.
[0026] When using the nonwoven fabric of this invention as field fastener female material, as for the rate that the heat welding section occupies on a nonwoven fabric front face, it is desirable that it is 10 - 50%, and it is 15 - 30% more preferably. concrete -- the area of a top face -- 0.35-1mm2 the embossing roll with which 10-100 small projections per two were arranged 1cm -- more -- desirable -- 0.4-0.8mm2 the small projection which has a top face -- 1cm2 It is good to use what was arranged per 20-70 pieces.
[0027] And after carrying out heat weld of both the fiber layer partially, heights are formed between each heat welding section of the second fiber layer by carrying out the heat shrink of the first fiber layer. The manufacture approach of the nonwoven fabric of this invention is adopting specific heat shrink nature fiber or heat welding nature fiber, and is characterized by advancing mostly the heat welding of both the fiber layer, and the heat shrink of the first fiber layer to coincidence. For example, the fiber which consists of an ethylene-propylene random copolymer previously illustrated as heat shrink nature fiber is very rich in shrinkage characteristics, and since it contracts also with heating of the slight time amount which passes through between rolls, if this is used, heat welding and a heat shrink can perform it by heat treatment of a single step. That is, if heating pressure treatment is performed between hot calender rolls, this fiber will act as heat welding nature fiber first, and will be contracted after that in the form where the remaining heat obtained from the hot calender roll is used. Moreover, if the rate of a heat shrink is high even if it is heat shrink nature fiber which does not show heat welding nature in itself, the same processing is possible by using heat welding nature fiber together suitably.
[0028] It is necessary to determine heat treatment temperature and a pressure according to heat shrink nature fiber or heat welding nature fiber. for example, the case where the fiber which consists of an ethylene-propylene random copolymer as heat shrink nature fiber is used -- the temperature (T degrees C) of a roll -- within the limits of 110<T<Tm +30 -- it is necessary to set up -- desirable -- 115< T<145 -- it is good to make it more preferably 120< T<130. In order that both the fiber layer may not fully paste up, it exfoliates, or below 110 degrees C, it becomes easy to produce the fuzz of a fastener for poor sticking by pressure. Conversely, if it exceeds 145 degrees C, when the fiber in the second fiber layer consists of thermoplastic fiber, fiber does melting and softening of, a fiber configuration is no longer maintained, and it becomes the cause of the poor engagement with male material. Moreover, the pressure during a roll has 25 or more kg/cm 85 or less desirable kg/cm. It becomes being less than 25 kg/cm with poor sticking by pressure, and becomes easy to produce interlaminar peeling, and if 85 kg/cm is exceeded, un-arranging [that a hole opens in the heat welding section] will arise.
[0029] After performing heat welding processing at temperature lower than the contraction initiation temperature of heat shrink nature fiber, it can manufacture also by heat-treating separately and shrinking the first fiber layer, but a process becomes short, and since it is advantageous also in energy, as for the nonwoven fabric of this invention, manufacture of the direction which heat-treats by the single step is attained by low cost, rather than heat-treating in two steps.
[0030] Thus, as for the nonwoven fabric of this invention obtained, heights are formed in the second fiber layer of the heat shrink of the first fiber layer. And since fiber seldom joins in these heights but the degree of freedom is high comparatively, it is in the condition of being easy to engage with the hook section of field fastener male material. And these heights can engage with a hook type, a mushroom mold, and any male material of a configuration. Moreover, since a part of fiber which forms heights by being the heat welding section is being fixed in the heat welding section, the stability of heights of between heights and heights is [both the fiber layer] very high, and even when it engages with male material repeatedly, there is little fuzz. Therefore, the nonwoven fabric of this invention is very useful as field fastener female material.

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OPERATION

[Function] It is the nonwoven fabric which consists of at least two kinds of fiber which consists of contracted fiber layers and non-shrinkage-characteristics fiber according to the nonwoven fabric of above mentioned this invention, and is the heat welding section partially. When it is unified in the thickness direction, and said non-shrinkage-characteristics fiber projects into a surface part and forms heights in the non-heat welding section between each heat welding section, it is flexible and the nonwoven fabric which has irregularity on the front face on which the engagement force was suitable for the cheap high and field fastener female material of cost can be realized.
[0032] Next, according to the field fastener female material of this invention, by using the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part as the engagement section with the hook section of field fastener male material using the nonwoven fabric which has irregularity on the surface of the above, it is flexible and the engagement force can realize the cheap high and field fastener female material of cost.
[0033] Next, according to the approach of this invention, said nonwoven fabric and field fastener female material can be manufactured rationally efficiently. In this invention, the heat shrink of the first fiber layer containing heat shrink nature fiber is carried out by heat-treatment, and it carries out ******** which makes heights form in the second fiber layer. Moreover, the second fiber layer forms bulky heights by contraction of the first fiber layer, and these heights turn into the engagement section with the hook section of field fastener male material. And heat welding of both the fiber layer is carried out partially, it is unified, and this heat welding section collateralizes the strength of the whole nonwoven fabric, and the stability of heights is made to improve. Furthermore, since it becomes possible to form said heights between the heat welding section and the heat welding section, and to form the heights which have a desired pattern by adjusting the area of the heat welding section, spacing, etc. suitably, the heat welding section acts also as one of the factors which determines the surface state of the nonwoven fabric of this invention.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the suitable nonwoven fabric and suitable field fastener female material for disposable goods like field fastener female material, especially a disposable diaper which have irregularity on a front face, and its manufacture approach.
[0002]
[Description of the Prior Art] Usually, a field fastener consists of looping female material and female material which has the hook sections, such as a ** type which engages with female material, or a mushroom mold. Since a field fastener can be used simple, it is formed in the closing motion sections, such as garments, shoes, a bag, and daily necessaries, or the installation section of seat covering of a car, and is widely used in many fields. Moreover, recently, what stuck field fastener female material on the waist section of a diaper is proposed in order to make a disposable diaper fix or fix, and practical use is presented.
[0003] Generally as field fastener female material, the sheet which the loop formation formed from the monofilament and multifilament of synthetic resin projected from one side of woven knitted goods is used widely. Such female material has the very strong engagement force with female material, and the engagement force is useful in order not to decline to use of a repeat, either.
[0004] However, it is unsuitable to use [diaper / disposable] such female material. That is, it is because ** is high and generally lacks in flexibility, so the female material which has the structure which the above loop formations projected from woven knitted goods may give the wearer of a diaper sense of incongruity. Moreover, since the manufacturing cost of such female material generally attaches highly, it is not realistic to use such female material in the intense disposable goods of price competition, and it is more rational than the engagement force of a fastener to think the manufacturing cost as important rather.
[0005] Then, the field fastener which thought the manufacturing cost as important from the former has been proposed variously. For example, in JP,62-38105,A, the field fastener member which stitching was performed [member] on the nonwoven sheet and made the loop formation project on a nonwoven fabric sheet is proposed. Moreover, in JP,4-105602,A, it is indicated by inserting in a textile the multifilament line of thread which has a loop formation, a coil, etc. on a front face by fluid disturbance processing at a large number that it has sufficient engagement force and the field fastener female material which is not bulky can be obtained. Moreover, in JP,6-33359,A, the field fastener female material which consists of a continuous glass fiber nonwoven fabric which made many wrinkles form in a front face is indicated.
[0006]
[Problem(s) to be Solved by the Invention] However, there are the following inconvenient points in these field fastener female material. For example, although it is satisfactory in respect of the engagement force, a manufacturing cost becomes high and the fastener member shown by JP,62-38105,A is still unsuitable for the intense disposable goods of price competition, in order to perform stitching to a

nonwoven fabric. Although especially a problem similarly does not have what is indicated by JP,4-105602,A about exfoliation strength and tensile strength, since it is necessary to carry out weaving or more of one using specific multifilament, a manufacturing cost becomes high. Although the continuous glass fiber nonwoven fabric shown by JP,6-33359,A can be manufactured cheaply on the other hand and it is suitable for the so-called disposable goods, the engagement force with male material is weak, and when used for a diaper, there is a trouble of being easy to break away by motion of people.
[0007] In order that this invention may solve said conventional problem, it is flexible and aims to let the engagement force provide with the manufacture approach the nonwoven fabric which has irregularity on the front face suitable for the cheap high and field fastener female material of cost, and a field fastener female material list.
[0008]
[Means for Solving the Problem] In order to attain said purpose, the nonwoven fabric which has irregularity on the surface of this invention The second fiber layer which contains non-shrinkage-characteristics fiber to one side or both sides containing the fiber which carried out the heat shrink of the first fiber layer is the nonwoven fabric which comes to carry out a laminating. It is characterized by for said second fiber layer projecting both the fiber layer into a surface part between each heat welding section by being partially unified in the thickness direction by the heat welding section, and forming heights.
[0009] In invention of said nonwoven fabric, the first fiber layer contains the fiber in which the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% carried out the heat shrink 50% of the weight or more. The second fiber layer consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts. And heat welding nature fiber is contained in one [at least] fiber layer of the first fiber layer or the second fiber layer 30% of the weight or more among the nonwoven fabric, and, as for both the fiber layer, it is desirable to carry out heat weld partially by said heat welding fiber.
[0010] Moreover, in invention of said nonwoven fabric, it is desirable that it is fiber which the fiber which constitutes the fiber layer which the first fiber layer contracted turns into from the polymer in which fusion peak temperature (Tmdegree C) contains the ethylene-propylene random copolymer of 130<Tm<145 70% of the weight or more.
[0011] Moreover, in invention of said nonwoven fabric, it is desirable that it is the sheath-core mold bicomponent fiber with which non-shrinkage-characteristics fiber has arranged the ethylene-propylene random copolymer for the sheath component, and has arranged the polyolefine component for the heart component.
[0012] Moreover, in invention of said nonwoven fabric, it is desirable that non-shrinkage-characteristics fiber is the staple fiber (staple fiber) of the range of the fineness of 1.5-10 deniers and 38-76mm fiber length.
[0013] Next, the field fastener female material of this invention is a nonwoven fabric which has irregularity on the front face of said configuration, and the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part are characterized by being the engagement section with the hook section of field fastener male material.
[0014] Next, the manufacture approach of a nonwoven fabric of having irregularity on the surface of this invention The first fiber layer contains the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% 50% of the weight or more. The second fiber layer consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts. And two fiber layers which heat welding nature fiber was made to be contained in one [at least] fiber layer of the first fiber layer or the second fiber layer 30% of the weight or more among the nonwoven fabric are prepared. By carrying out the laminating of the second fiber layer to one side or both sides of the first fiber layer, using an embossing roll for this, and performing heating pressure treatment at the temperature near the melting point of the above-mentioned heat shrink nature fiber It is characterized by carrying out the heat shrink of said heat shrink nature fiber, and making heights form between each heat welding section of the second fiber layer at the same time it

carries out heat welding of both the fiber layer partially.
[0015] Eyes 10-40g/m2 by which the second fiber layer was constituted from a staple fiber with a fineness [of 1.5-10 deniers], and a fiber length of 38-76mm in said approach It is desirable that it is a staple fiber web.
[0016] Moreover, it sets to said approach and the first fiber layer is the fiber length of 38-76mm and eyes 10 - 40 g/m2. It is desirable that it is the parallel web of the range. Moreover, it sets to said approach and the area of a top face is 2 0.35-1mm as an embossing roll. It is a small projection 1cm 2 Forming the nonwoven fabric whose per 10-100-piece area percentage of it being arranged and occupying on the nonwoven fabric front face of the heat welding section using ** is 10 - 50% explains the contents of this invention below good **.
[0017] The second fiber layer which consists of non-shrinkage-characteristics fiber which is not substantially contracted at the temperature in which the heat shrink nature fiber carries out a heat shrink to the first fiber layer containing heat shrink nature fiber carries out the laminating of this invention, and it is characterized by making the bulky heights which were suitable at engagement in the hook section of field fastener male material at the second fiber layer using the difference of both rate of a heat shrink form. Therefore, as for the heat shrink nature fiber which fully needs to carry out the heat shrink of the first fiber layer, and is contained in the first fiber layer, it is desirable for the rate of the maximum heat shrink to be at least 50%, and, as for the mixed rate, it is desirable that it is 50 % of the weight or more. The rate of the maximum heat shrink means the greatest thing in the rate of a heat shrink shown while the heated fiber had maintained the configuration of fiber here. When the rate of the maximum heat shrink uses less than 50% of heat shrink nature fiber, or when the rate of heat shrink nature fiber is less than 50 % of the weight, the heat shrink of the first fiber layer is inadequate, and the heights formed in the second fiber layer will become scarce at a loft, and will stop being able to engage with male material easily.
[0018] If heat shrink nature fiber is contained 50% of the weight or more, other fiber is mixable in the first fiber layer. especially the fiber to mix is limited -- not having -- the arbitration from polyolefin fibers, such as polyester fiber, such as polyamide fibers, such as semi-synthetic fibers, such as regenerated fibers, such as rayon, and acetate, nylon 6, and Nylon 66, polyethylene terephthalate, and polybutylene terephthalate, polyethylene, and polypropylene, etc. -- 1 -- or it can be used, choosing two or more. Of course, the first fiber layer may consist of only heat shrink nature fiber.
[0019] It is desirable to use the fiber which consists of a polymer which contains the ethylene-propylene random copolymer which has fusion peak temperature (Tmdegree C) within the limits of 130<Tm<145 degree C as heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% 70% of the weight or more by this invention. Fusion peak temperature means temperature in case a DSC curve shows re-**** here, when a differential scanning calorimeter (DSC) performs heat-of-fusion measurement of a polymer. A polymer comes to show rubber-elasticity that fusion peak temperature is less than 130 degrees C here, and the card permeability of fiber worsens. On the contrary, if it exceeds 145 degrees C, since the heat shrink nature of fiber becomes usual polypropylene extent, it is not desirable.
[0020] Although the modes of the first fiber layer may be any, such as a parallel web which consists of a staple fiber, a cross web, a semi random web, and a random web, heights are formed in the second fiber layer for the way which centralizes the direction of the heat shrink of a fiber web on an one direction at homogeneity. Therefore, as for the first fiber layer, it is desirable that it is a parallel web. In this case, when card permeability, the conditions of a web, etc. are taken into consideration, as for the fiber length of a staple fiber, it is desirable that it is 38-76mm. Moreover, at this invention, they are the eyes of the first fiber layer 10-40g/m2 Especially the thing to do is desirable and it is 10 g/m2. In the following, unevenness is made to a web, and in order not to carry out a heat shrink to homogeneity, heights serve as an ununiformity. on the contrary, eyes -- 40 g/m2 if large -- the thickness of the fiber web after a heat shrink -- large -- becoming -- the fastener whole -- ** -- it becomes high and is inferior to flexibility or permeability.
[0021] As for the second fiber layer, much heights are formed in the front face of the heat shrink of the

first fiber layer. Therefore, the fiber which constitutes the second fiber layer can form a fiber set object, and especially a material etc. will not be limited if it does not contract substantially in the temperature which heat shrink nature fiber contracts. for example, the arbitration out of polyamide fibers, such as polyester fiber, such as polyolefin fibers, such as natural fibers, such as semi-synthetic fibers, such as regenerated fibers, such as rayon, and acetate, cotton, and wool yarn, polypropylene, polyethylene, and polybutene, polyethylene terephthalate, and polybutylene terephthalate, nylon 6, and Nylon 66, -- 1 -- or it can be used, choosing two or more. A fiber configuration etc. is not limited but the fiber which has a division nature bicomponent fiber and a variant cross section can be used for arbitration.

[0022] Since heat welding of the first fiber layer and the second fiber layer is especially carried out partially by this invention, as for non-shrinkage-characteristics fiber, it is desirable for junction nature with the first fiber layer to be good fiber. For example, when using the fiber which consists of an ethylene-propylene random copolymer mentioned above as heat shrink nature fiber, a sheath-core mold bicomponent fiber with which an ethylene-propylene random copolymer occupies a fiber front face is good to use an assembled-die bicomponent fiber.

[0023] Although especially the mode of the second fiber layer is not limited, when engagement nature with the hook section of field fastener male material is taken into consideration, the so-called staple fiber webs, such as a parallel web which consists of a staple fiber, a cross web, a semi random web, and a random web, are desirable. In this case, as for fiber length, it is desirable that it is 38-76mm, and if it is less than 38mm, when it is easy to produce fuzz in heights, and it will be repeat-engaged and will exfoliate further, the problem that the engagement force of a fastener declines produces it. If fiber length exceeds 76mm, card permeability will worsen, and it becomes impossible moreover, to obtain the web in which conditions were ready. Moreover, as for the fineness of fiber, it is desirable that it is 1.5-10 deniers. If fineness is less than 1.5 deniers, it will be easy to go out by engagement in the hook section of male material, and exfoliation, will become the cause of fuzz, and will become the cause of an engagement force fall further. On the contrary, if fineness exceeds 10 deniers, the flexibility of the whole fastener is spoiled, by the web of these eyes, in order that the configuration fiber number per unit volume may decrease as fineness becomes large, the number of fiber which engages with the hook section of male material will decrease, and the engagement force will decline.

[0024] Since it is necessary to carry out heat welding of the first fiber layer and the second fiber layer partially and the nonwoven fabric of this invention needs to make them unify, it is [being contained 30% of the weight or more in the whole fiber from which heat welding nature fiber constitutes a nonwoven fabric at least in one side of both the fiber layer] desirable. If heat welding nature fiber is contained in both the first fiber layer and the second fiber layer, since between both fiber layers will be joined more firmly, it is more desirable. It is good to use what softens, or fuses and carries out heat weld in this invention at temperature lower than the contraction initiation temperature of heat shrink nature fiber. Moreover, this heat welding nature fiber can also be made to serve a double purpose for the heat shrink nature fiber mentioned above. For example, since it softens or fuses and heat welding nature is also shown at the same time it carries out a heat shrink by performing heating pressure treatment at 115-145 degrees C, the fiber which consists of an ethylene-propylene random copolymer illustrated previously can be used also as heat welding nature fiber.

[0025] The laminating of the above-mentioned first fiber layer and the second fiber layer is carried out, and heat welding is partially carried out, and they are unified. Heating and the approach of pressurizing are desirable, passing between an embossing roll and the flat rolls arranged in the lower part section as an approach of carrying out heat weld partially. The thing of a slit type with which irregularity with a top face circularly regular to the thing which has a gearing's configuration where regular irregularity was elsewhere formed crosswise [of a roll] although much polygonal small projections were arranged in the roll surface, or the lengthwise direction of a roll as an embossing roll is formed etc. can be used. Moreover, if the heat welding section is prepared regularly, since the heights formed between each heat welding section will also become regular, the beautiful nonwoven fabric which presents an orderly appearance can be obtained.

[0026] When using the nonwoven fabric of this invention as field fastener female material, as for the

rate that the heat welding section occupies on a nonwoven fabric front face, it is desirable that it is 10 - 50%, and it is 15 - 30% more preferably. concrete -- the area of a top face -- 0.35-1mm2 the embossing roll with which 10-100 small projections per two were arranged 1cm -- more -- desirable -- 0.4-0.8mm2 the small projection which has a top face -- 1cm2 It is good to use what was arranged per 20-70 pieces.
[0027] And after carrying out heat weld of both the fiber layer partially, heights are formed between each heat welding section of the second fiber layer by carrying out the heat shrink of the first fiber layer. The manufacture approach of the nonwoven fabric of this invention is adopting specific heat shrink nature fiber or heat welding nature fiber, and is characterized by advancing mostly the heat welding of both the fiber layer, and the heat shrink of the first fiber layer to coincidence. For example, the fiber which consists of an ethylene-propylene random copolymer previously illustrated as heat shrink nature fiber is very rich in shrinkage characteristics, and since it contracts also with heating of the slight time amount which passes through between rolls, if this is used, heat welding and a heat shrink can perform it by heat treatment of a single step. That is, if heating pressure treatment is performed between hot calender rolls, this fiber will act as heat welding nature fiber first, and will be contracted after that in the form where the remaining heat obtained from the hot calender roll is used. Moreover, if the rate of a heat shrink is high even if it is heat shrink nature fiber which does not show heat welding nature in itself, the same processing is possible by using heat welding nature fiber together suitably.
[0028] It is necessary to determine heat treatment temperature and a pressure according to heat shrink nature fiber or heat welding nature fiber. for example, the case where the fiber which consists of an ethylene-propylene random copolymer as heat shrink nature fiber is used -- the temperature (T degrees C) of a roll -- within the limits of 110<T<Tm +30 -- it is necessary to set up -- desirable -- 115< T<145 -- it is good to make it more preferably 120< T<130. In order that both the fiber layer may not fully paste up, it exfoliates, or below 110 degrees C, it becomes easy to produce the fuzz of a fastener for poor sticking by pressure. Conversely, if it exceeds 145 degrees C, when the fiber in the second fiber layer consists of thermoplastic fiber, fiber does melting and softening of, a fiber configuration is no longer maintained, and it becomes the cause of the poor engagement with male material. Moreover, the pressure during a roll has 25 or more kg/cm 85 or less desirable kg/cm. It becomes being less than 25 kg/cm with poor sticking by pressure, and becomes easy to produce interlaminar peeling, and if 85 kg/cm is exceeded, un-arranging [that a hole opens in the heat welding section] will arise.
[0029] After performing heat welding processing at temperature lower than the contraction initiation temperature of heat shrink nature fiber, it can manufacture also by heat-treating separately and shrinking the first fiber layer, but a process becomes short, and since it is advantageous also in energy, as for the nonwoven fabric of this invention, manufacture of the direction which heat-treats by the single step is attained by low cost, rather than heat-treating in two steps.
[0030] Thus, as for the nonwoven fabric of this invention obtained, heights are formed in the second fiber layer of the heat shrink of the first fiber layer. And since fiber seldom joins in these heights but the degree of freedom is high comparatively, it is in the condition of being easy to engage with the hook section of field fastener male material. And these heights can engage with a hook type, a mushroom mold, and any male material of a configuration. Moreover, since a part of fiber which forms heights by being the heat welding section is being fixed in the heat welding section, the stability of heights of between heights and heights is [both the fiber layer] very high, and even when it engages with male material repeatedly, there is little fuzz. Therefore, the nonwoven fabric of this invention is very useful as field fastener female material.
[0031]
[Function] According to the nonwoven fabric of above mentioned this invention, it is the nonwoven fabric which consists of at least two kinds of fiber which consists of contracted fiber layers and non-shrinkage-characteristics fiber. When it is partially unified in the thickness direction by the heat welding section, and said non-shrinkage-characteristics fiber projects into a surface part and forms heights in the non-heat welding section between each heat welding section, it is flexible and the nonwoven fabric which has irregularity on the front face on which the engagement force was suitable for the cheap high and field fastener female material of cost can be realized.

[0032] Next, according to the field fastener female material of this invention, by using the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part as the engagement section with the hook section of field fastener male material using the nonwoven fabric which has irregularity on the surface of the above, it is flexible and the engagement force can realize the cheap high and field fastener female material of cost.
[0033] Next, according to the approach of this invention, said nonwoven fabric and field fastener female material can be manufactured rationally efficiently. In this invention, the heat shrink of the first fiber layer containing heat shrink nature fiber is carried out by heat-treatment, and it carries out ******** which makes heights form in the second fiber layer. Moreover, the second fiber layer forms bulky heights by contraction of the first fiber layer, and these heights turn into the engagement section with the hook section of field fastener male material. And heat welding of both the fiber layer is carried out partially, it is unified, and this heat welding section collateralizes the strength of the whole nonwoven fabric, and the stability of heights is made to improve. Furthermore, since it becomes possible to form said heights between the heat welding section and the heat welding section, and to form the heights which have a desired pattern by adjusting the area of the heat welding section, spacing, etc. suitably, the heat welding section acts also as one of the factors which determines the surface state of the nonwoven fabric of this invention.
[0034]
[Example] Below, an example is given and this invention is explained concretely. this invention person etc. the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% to one side or both sides of the first fiber layer which it comes to contain 50% of the weight or more By carrying out the laminating of the second fiber layer which consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts, using an embossing roll for this, and performing heating pressure treatment at the temperature near the melting point of the above-mentioned heat shrink nature fiber While carrying out heat welding of both the fiber layer partially, when the nonwoven fabric which is made to carry out the heat shrink of said heat shrink nature fiber, is made to form heights between each heat welding section of the second fiber layer, and has irregularity on a front face is created, it finds out that this is suitable for field fastener female material, and results in this invention.
[0035] In addition, the engagement force at the time of using among the following examples as the thickness of the obtained nonwoven fabric, tensile strength, and field fastener female material and evaluation of stiffness and softness (flexibility) were performed as follows.
(1) Thickness : they are 3 g/cm2 to the obtained nonwoven fabric. It measured, where a load is added.
(2) Tensile strength : JIS L It measured according to 1096, the 5x15cm sample was elongated by part for 30cm/, and the load value at the time of cutting was made powerful.
(3) Engagement force : cut each sample in width of face of 40mm, and, for a tip configuration, the hook section of a mushroom mold is this 1mm 2 It was made to engage with the field fastener male material which is the thickness of about 0.4mm and width of face of 40mm which were prepared per nine pieces by die length of 25mm, and load engagement was carried out with the 2.0kg roller. Subsequently, the upper and lower sides of the male material of a part and female material which are not being engaged in this were performed at intervals of [of 10cm] the grip using the tensile strength test and measuring apparatus (tensilon equipment made from Cage En Tech), the tensile strength trial was performed by part for 10cm/in a grip and rate, the maximum strength was read, and this was made into the engagement force. Moreover, the trial followed the first-time thing and the thing which repeated attachment and detachment 5 times.
(4) Stiffness and softness (flexibility) : bending die length was measured based on the cantilever method (JIS L 1085 A law), and stiffness and softness (flexibility) were evaluated.
[0036] (Examples 1-6) As heat shrink nature fiber, fusion peak temperature carried out melt spinning of the ethylene-propylene random copolymer which is 136 degrees C at 260 degrees C, and used what was extended 3.5 times (it abbreviates to front Naka and PNE). The rate of the maximum heat shrink of said PNE fiber was 92% at 150 degrees C. This is made into a staple fiber (staple fiber) with a fineness [of 2

deniers], and a fiber length of 51mm, and it is eyes 10 g/m2 at a parallel card. The parallel web was created and this fiber web was used as the first fiber layer. In addition, after the measuring method of the rate of the maximum heat shrink bundles 50 fiber, puts the mark on predetermined spacing with black cotton yarn and puts it about 30 seconds to the bottom of an ambient atmosphere with a temperature of 150 degrees C, it measures spacing which put the mark and computes the rate of a heat shrink. Although measured at temperature higher than fusion peak temperature (melting point), it can be made to contract maintaining a fiber configuration, since the processing time was short.

[0037] Next, as non-shrinkage-characteristics fiber, the sheath component was carried out at 250 degrees C, the ethylene-propylene random copolymer and the heart component carried out melting compound spinning of the heart component at 280 degrees C so that the component ratio of a sheath-core might become 63/37 about the sheath-core mold bicomponent fiber of polypropylene, and the sheath component used what was extended 2.4 times (it abbreviates to front Naka and NBF-P). This is made into a staple fiber (staple fiber) with a fineness [of 2 deniers], and a fiber length of 51mm, and it is eyes 20 g/m2 at a parallel card. The parallel web was created and this fiber web was used as the second fiber layer.

[0038] Then, the laminating of the second fiber layer is carried out on the first fiber layer, and the area of a top face is this laminated material 0.785mm 2 The small projection of a truncated-cone mold is 2 1cm. The embossing roll arranged regularly 25 hits, Among both the rolls of the flat roll arranged caudad, it introduces so that the first fiber layer may contact an embossing roll, and the heat shrink of the first fiber layer was carried out at the same time it carried out thermocompression bonding of both the fiber layer by the temperature and the pressure which are shown in front Naka, respectively.

[0039] The front face of the nonwoven fabric of the acquired example 1 has regular irregularity, and the flat surface was carrying out the configuration as shown in drawing 1 . In drawing 1 , the regular heights 5 and the regular crevice (welding section) 4 existed in the front face of a nonwoven fabric 1, and said heights 5 were mainly formed in the second fiber layer 3, and the part under said crevice (welding section) 4 and said heights 5 was formed, after the first fiber layer 2 had mainly contracted. Drawing 2 shows the rear face of drawing 1 , and is mainly covered in the first fiber layer 2, and the crevice (welding section) 4 existed regularly. Next, when the typical cross section of drawing 1 -2 was seen, the heat welding section 4 turned into a crevice like drawing 3 , and the second fiber layer 3 formed heights 5 by the heat shrink of the first fiber layer 2. Moreover, the hand of this nonwoven fabric was flexibly good. The thickness of each nonwoven fabric, tensile strength, and the engagement force are shown in Table 1.

[0040]

[Table 1]

条件及び結果			実施例					
			1	2	3	4	5	6
熱収縮性繊維の種類			PNE	PNE	PNE	PNE	PNE	PNE
複合繊維の種類			NBF-P	NBF-P	NBF-P	NBF-P	NBF-P	NBF-P
ウエブの目付（g／m^2）			30	30	30	30	30	30
上ロール処理温度（℃）			125	125	128	128	135	135
下ロール処理温度（℃）			125	125	128	128	135	135
ロール圧（kg／cm）			25	50	25	50	25	50
処理後の非融着部の厚み(mm)			0.94	1.02	0.81	0.79	0.68	0.75
処理後の融着部の厚み(mm)			0.25	0.23	0.20	0.18	0.16	0.15
引張強力（kg／5cm）	タテ		8.27	6.41	10.6	9.29	9.36	8.88
	ヨコ		1.69	1.53	1.37	1.72	1.91	2.39
係合力(kg/4cm)	タテ	初回	1.80	1.70	1.80	2.0	1.50	1.80
		5回	1.75	1.70	1.80	1.9	1.50	1.60
	ヨコ	初回	1.70	1.60	1.80	2.10	1.60	1.75
		5回	1.70	1.55	1.75	2.10	1.55	1.55

[0041] The tensile strength of front Naka and the length direction and the engagement force are the powerful things when making the grain direction in a fiber web into the die-length direction of female material, and the width direction is a powerful thing when making into the die-length direction of female material the grain direction in a fiber web, and the direction which makes a 90-degree angle.
[0042] (Example 1 of a comparison) The heart component / sheath component used in the example 1 use only the sheath-core mold bicomponent fiber of polypropylene / ethylene-propylene random copolymer, and they are eyes 30 g/m2 The parallel web was created, heating pressure treatment was performed using the embossing roll and the flat roll by the same approach as an example 1, and this web was made with the nonwoven fabric.
[0043] (Example 2 of a comparison) The polypropylene fiber (fineness of 2 deniers, fiber length of 51mm) which hardly shows heat shrink nature is used, and it is eyes 10 g/m2 at a parallel card. The parallel web was created and this fiber web was used as the first fiber layer. Moreover, 20g of eyes/and m2 which the same heart component / sheath component as having used it in the example 1 as the second fiber layer become from the sheath-core mold bicomponent fiber of a pile in polypropylene / ethylene-propylene random The parallel web was prepared. And the laminating of the second fiber layer was carried out on the first fiber layer, heating pressure treatment was performed by the same approach as an example 1, and the nonwoven fabric was created. The engine performance of the nonwoven fabric of the examples 1-2 of a comparison is shown in Table 2.
[0044]
[Table 2]

条件及び結果			比較例	
			1	2
熱収縮性繊維の種類			—	ポリプロピレン
複合繊維の種類			NBF-P	NBF-P
ウエブの目付（g／m^2）			30	30
上ロール処理温度（℃）			128	128
下ロール処理温度（℃）			128	128
ロール圧（kg／cm）			50	50
処理後の非融着部の厚み(mm)			0.45	0.51
処理後の融着部の厚み(mm)			0.19	0.20
引張強力（kg／5cm）		タテ	1.26	7.84
		ヨコ	1.83	1.08
係合力(kg/4cm)	タテ	初回	1.20	1.40
		5回	1.00	1.30
	ヨコ	初回	1.50	1.30
		5回	1.30	1.30

[0045] Next, about the female material of the nonwoven fabric of examples 1-6, and a commercial field fastener (Kuraray [Co., Ltd.] make: trade name, "piece-of-Velcro Velcro"), based on the cantilever method (JIS L 1085 A law), bending die length was measured, respectively, and stiffness and softness were evaluated. The obtained result is shown in Table 3. The bending die length of front Naka and the length direction measures the grain direction in a fiber web as a die-length direction, and the bending die length of the width direction measures the grain direction in a fiber web, and the direction which makes a 90-degree angle as a die-length direction.

[0046]

[Table 3]

実施例・比較例 番号		実施例 1	2	3	4	5	6	比較例 1
柔軟度 タテ	(mm)	27	25	30	25	55	45	72
柔軟度 ヨコ	(mm)	27	24	30	27	49	47	—

[0047]

[Effect of the Invention] According to the nonwoven fabric of this invention, it is the nonwoven fabric which consists of at least two kinds of fiber which consists of contracted fiber layers and non-shrinkage-characteristics fiber as explained above. When it is partially unified in the thickness direction by the heat welding section, and said non-shrinkage-characteristics fiber projects into a surface part and forms

heights in the non-heat welding section between each heat welding section, it is flexible and the nonwoven fabric which has irregularity on the front face on which the engagement force was suitable for the cheap high and field fastener female material of cost can be realized.

[0048] Next, according to the field fastener female material of this invention, by using the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part as the engagement section with the hook section of field fastener male material using the nonwoven fabric which has irregularity on the surface of the above, it is flexible and the engagement force can realize the cheap high and field fastener female material of cost.

[0049] Next, according to the approach of this invention, said nonwoven fabric and field fastener female material can be manufactured rationally efficiently. The nonwoven fabric of this invention has detailed irregularity on a front face, and has structure which was very suitable for field fastener female material. And since the degree of freedom of fiber is bulky comparatively highly in the heights formed between each heat welding section, the nonwoven fabric of this invention is what was remarkably rich in flexibility compared with the field fastener female material currently used widely. So, when this is used for a disposable diaper etc., sense of incongruity is not given to a wearer. Furthermore, since it is obtained by processing the web by which the laminating was carried out using a hot calender roll, without passing through a complicated production process, the nonwoven fabric of this invention can be produced comparatively cheaply. Therefore, the nonwoven fabric of this invention can be especially used preferably as field fastener female material used for disposable goods, such as a diaper with which flexibility and low cost are demanded.

[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

[Example] Below, an example is given and this invention is explained concretely. this invention person etc. the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% to one side or both sides of the first fiber layer which it comes to contain 50% of the weight or more By carrying out the laminating of the second fiber layer which consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts, using an embossing roll for this, and performing heating pressure treatment at the temperature near the melting point of the above-mentioned heat shrink nature fiber While carrying out heat welding of both the fiber layer partially, when the nonwoven fabric which is made to carry out the heat shrink of said heat shrink nature fiber, is made to form heights between each heat welding section of the second fiber layer, and has irregularity on a front face is created, it finds out that this is suitable for field fastener female material, and results in this invention.
[0035] In addition, the engagement force at the time of using among the following examples as the thickness of the obtained nonwoven fabric, tensile strength, and field fastener female material and evaluation of stiffness and softness (flexibility) were performed as follows.
(1) Thickness : they are 3 g/cm2 to the obtained nonwoven fabric. It measured, where a load is added.
(2) Tensile strength : JIS L It measured according to 1096, the 5x15cm sample was elongated by part for 30cm/, and the load value at the time of cutting was made powerful.
(3) Engagement force : cut each sample in width of face of 40mm, and, for a tip configuration, the hook section of a mushroom mold is this 1mm 2 It was made to engage with the field fastener male material which is the thickness of about 0.4mm and width of face of 40mm which were prepared per nine pieces by die length of 25mm, and load engagement was carried out with the 2.0kg roller. Subsequently, the upper and lower sides of the male material of a part and female material which are not being engaged in this were performed at intervals of [of 10cm] the grip using the tensile strength test and measuring apparatus (tensilon equipment made from Cage En Tech), the tensile strength trial was performed by part for 10cm/in a grip and rate, the maximum strength was read, and this was made into the engagement force. Moreover, the trial followed the first-time thing and the thing which repeated attachment and detachment 5 times.
(4) Stiffness and softness (flexibility) : bending die length was measured based on the cantilever method (JIS L 1085 A law), and stiffness and softness (flexibility) were evaluated.
[0036] (Examples 1-6) As heat shrink nature fiber, fusion peak temperature carried out melt spinning of the ethylene-propylene random copolymer which is 136 degrees C at 260 degrees C, and used what was extended 3.5 times (it abbreviates to front Naka and PNE). The rate of the maximum heat shrink of said PNE fiber was 92% at 150 degrees C. This is made into a staple fiber (staple fiber) with a fineness [of 2 deniers], and a fiber length of 51mm, and it is eyes 10 g/m2 at a parallel card. The parallel web was created and this fiber web was used as the first fiber layer. In addition, after the measuring method of the rate of the maximum heat shrink bundles 50 fiber, puts the mark on predetermined spacing with black cotton yarn and puts it about 30 seconds to the bottom of an ambient atmosphere with a temperature of 150 degrees C, it measures spacing which put the mark and computes the rate of a heat shrink. Although

measured at temperature higher than fusion peak temperature (melting point), it can be made to contract maintaining a fiber configuration, since the processing time was short.
[0037] Next, as non-shrinkage-characteristics fiber, the sheath component was carried out at 250 degrees C, the ethylene-propylene random copolymer and the heart component carried out melting compound spinning of the heart component at 280 degrees C so that the component ratio of a sheath-core might become 63/37 about the sheath-core mold bicomponent fiber of polypropylene, and the sheath component used what was extended 2.4 times (it abbreviates to front Naka and NBF-P). This is made into a staple fiber (staple fiber) with a fineness [of 2 deniers], and a fiber length of 51mm, and it is eyes 20 g/m2 at a parallel card. The parallel web was created and this fiber web was used as the second fiber layer.
[0038] Then, the laminating of the second fiber layer is carried out on the first fiber layer, and the area of a top face is this laminated material 0.785mm 2 The small projection of a truncated-cone mold is 2 1cm. The embossing roll arranged regularly 25 hits, Among both the rolls of the flat roll arranged caudad, it introduces so that the first fiber layer may contact an embossing roll, and the heat shrink of the first fiber layer was carried out at the same time it carried out thermocompression bonding of both the fiber layer by the temperature and the pressure which are shown in front Naka, respectively.
[0039] The front face of the nonwoven fabric of the acquired example 1 has regular irregularity, and the flat surface was carrying out the configuration as shown in drawing 1 . In drawing 1 , the regular heights 5 and the regular crevice (welding section) 4 existed in the front face of a nonwoven fabric 1, and said heights 5 were mainly formed in the second fiber layer 3, and the part under said crevice (welding section) 4 and said heights 5 was formed, after the first fiber layer 2 had mainly contracted. Drawing 2 shows the rear face of drawing 1 , and is mainly covered in the first fiber layer 2, and the crevice (welding section) 4 existed regularly. Next, when the typical cross section of drawing 1 -2 was seen, the heat welding section 4 turned into a crevice like drawing 3 , and the second fiber layer 3 formed heights 5 by the heat shrink of the first fiber layer 2. Moreover, the hand of this nonwoven fabric was flexibly good. The thickness of each nonwoven fabric, tensile strength, and the engagement force are shown in Table 1.
[0040]
[Table 1]

条件及び結果			実施例					
			1	2	3	4	5	6
熱収縮性繊維の種類			PNE	PNE	PNE	PNE	PNE	PNE
複合繊維の種類			NBF-P	NBF-P	NBF-P	NBF-P	NBF-P	NBF-P
ウエブの目付（g／m^2）			30	30	30	30	30	30
上ロール処理温度（℃）			125	125	128	128	135	135
下ロール処理温度（℃）			125	125	128	128	135	135
ロール圧（kg／cm）			25	50	25	50	25	50
処理後の非融着部の厚み(mm)			0.94	1.02	0.81	0.79	0.68	0.75
処理後の融着部の厚み(mm)			0.25	0.23	0.20	0.18	0.16	0.15
引張強力（kg／5cm）	タテ		8.27	6.41	10.6	9.29	9.36	8.88
	ヨコ		1.69	1.53	1.37	1.72	1.91	2.39
係合力(kg/4cm)	タテ	初回	1.80	1.70	1.80	2.0	1.50	1.80
		5回	1.75	1.70	1.80	1.9	1.50	1.60
	ヨコ	初回	1.70	1.60	1.80	2.10	1.60	1.75
		5回	1.70	1.55	1.75	2.10	1.55	1.55

[0041] The tensile strength of front Naka and the length direction and the engagement force are the powerful things when making the grain direction in a fiber web into the die-length direction of female material, and the width direction is a powerful thing when making into the die-length direction of female material the grain direction in a fiber web, and the direction which makes a 90-degree angle.
[0042] (Example 1 of a comparison) The heart component / sheath component used in the example 1 use only the sheath-core mold bicomponent fiber of polypropylene / ethylene-propylene random copolymer, and they are eyes 30 g/m2 The parallel web was created, heating pressure treatment was performed using the embossing roll and the flat roll by the same approach as an example 1, and this web was made with the nonwoven fabric.
[0043] (Example 2 of a comparison) The polypropylene fiber (fineness of 2 deniers, fiber length of 51mm) which hardly shows heat shrink nature is used, and it is eyes 10 g/m2 at a parallel card. The parallel web was created and this fiber web was used as the first fiber layer. Moreover, 20g of eyes/and m2 which the same heart component / sheath component as having used it in the example 1 as the second fiber layer become from the sheath-core mold bicomponent fiber of a pile in polypropylene / ethylene-propylene random The parallel web was prepared. And the laminating of the second fiber layer was carried out on the first fiber layer, heating pressure treatment was performed by the same approach as an example 1, and the nonwoven fabric was created. The engine performance of the nonwoven fabric of the examples 1-2 of a comparison is shown in Table 2.
[0044]
[Table 2]

条件及び結果			比較例	
			1	2
熱収縮性繊維の種類			—	ポリプロピレン
複合繊維の種類			NBF-P	NBF-P
ウエブの目付（g／m^2）			30	30
上ロール処理温度（℃）			128	128
下ロール処理温度（℃）			128	128
ロール圧（kg／cm）			50	50
処理後の非融着部の厚み(mm)			0.45	0.51
処理後の融着部の厚み(mm)			0.19	0.20
引張強力（kg／5cm）	タテ		1.26	7.84
	ヨコ		1.83	1.08
係合力(kg/4cm)	タテ	初回	1.20	1.40
		5回	1.00	1.30
	ヨコ	初回	1.50	1.30
		5回	1.30	1.30

[0045] Next, about the female material of the nonwoven fabric of examples 1-6, and a commercial field fastener (Kuraray [Co., Ltd.] make: trade name, "piece-of-Velcro Velcro"), based on the cantilever method (JIS L 1085 A law), bending die length was measured, respectively, and stiffness and softness were evaluated. The obtained result is shown in Table 3. The bending die length of front Naka and the length direction measures the grain direction in a fiber web as a die-length direction, and the bending die length of the width direction measures the grain direction in a fiber web, and the direction which makes a 90-degree angle as a die-length direction.

[0046]

[Table 3]

実施例・比較例 番号		実施例						比較例
		1	2	3	4	5	6	1
柔軟度 タテ	(mm)	27	25	30	25	55	45	72
柔軟度 ヨコ	(mm)	27	24	30	27	49	47	—

[Translation done.]

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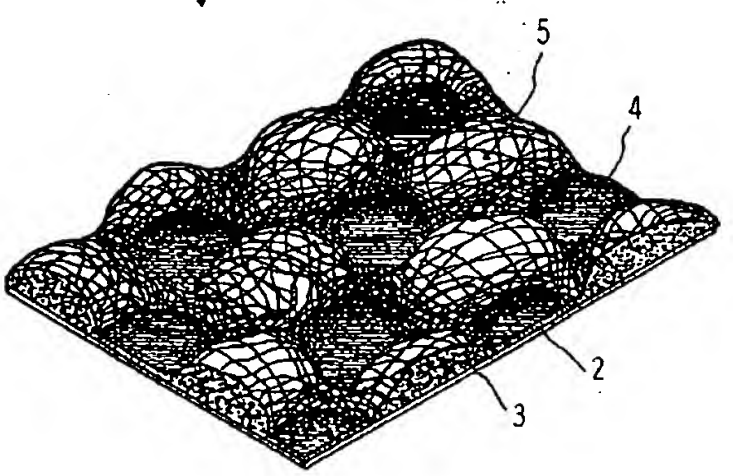
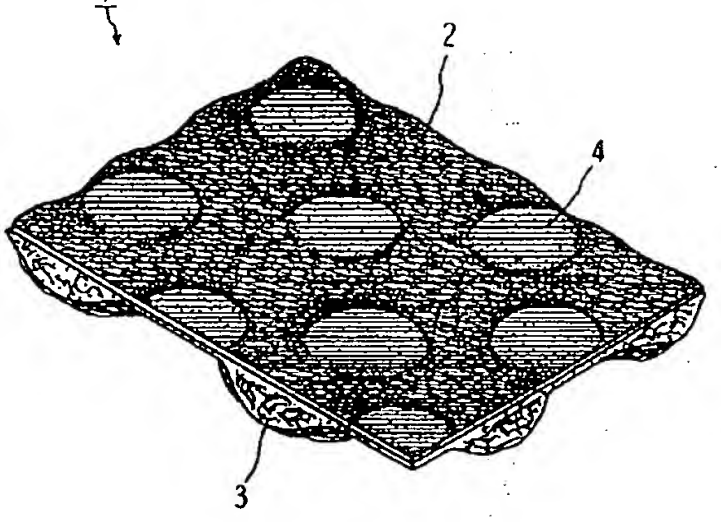
DRAWINGS

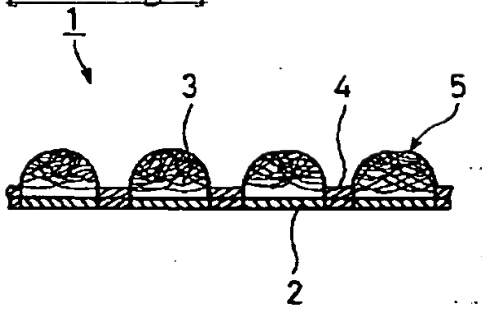
[Drawing 1]



[Drawing 2]



[Drawing 3]



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CLAIMS

[Claim(s)]
[Claim 1] It is the nonwoven fabric which has irregularity on the front face which the second fiber layer which contains non-shrinkage-characteristics fiber to one side or both sides containing the fiber which carried out the heat shrink of the first fiber layer is the nonwoven fabric which comes to carry out a laminating, and is characterized by to be partially unified in the thickness direction by the heat welding section, and for said second fiber layer to project both the fiber layer into a surface part between each heat welding section, and to form heights.
[Claim 2] The first fiber layer contains the fiber in which the heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% carried out the heat shrink 50% of the weight or more. The second fiber layer consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts. And it is the nonwoven fabric which heat welding nature fiber is contained in one [at least] fiber layer of the first fiber layer or the second fiber layer 30% of the weight or more among the nonwoven fabric, and has irregularity on the front face according to claim 1 as for which both the fiber layer is carrying out heat weld partially by said heat welding fiber.
[Claim 3] The nonwoven fabric which has irregularity on the front face according to claim 1 which is fiber which the fiber which constitutes the fiber layer which the first fiber layer contracted turns into from the polymer in which fusion peak temperature (Tmdegree C) contains the ethylene-propylene random copolymer of 130<Tm<145 70% of the weight or more.
[Claim 4] The nonwoven fabric which has irregularity on the front face according to claim 1 which is the sheath-core mold bicomponent fiber with which the non-shrinkage-characteristics fiber of the second fiber layer has arranged the ethylene-propylene random copolymer for the sheath component, and has arranged the polyolefine component for the heart component.
[Claim 5] The nonwoven fabric which has irregularity on the front face according to claim 1 whose non-shrinkage-characteristics fiber of the second fiber layer is the staple fiber (staple fiber) of the range of the fineness of 1.5-10 deniers, and 38-76mm fiber length.
[Claim 6] Field fastener female material characterized by being the nonwoven fabric which has irregularity on a front face given in any 1 term of claims 1-5, and the heights by which non-shrinkage-characteristics fiber was projected and formed in the surface part being the engagement section with the hook section of field fastener male material.
[Claim 7] The heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% as the first fiber layer is included 50% of the weight or more. It consists of non-shrinkage-characteristics fiber which does not carry out a heat shrink substantially at the temperature which said heat shrink nature fiber contracts as the second fiber layer. And the fiber layer which contains heat welding nature fiber in one [at least] fiber layer of the first fiber layer or the second fiber layer 30% of the weight or more among a nonwoven fabric is prepared. By carrying out the laminating of the second fiber layer to one side or both sides of the first fiber layer, and performing heating pressure treatment using a heating embossing roll at the temperature near the melting point of the above-mentioned heat shrink nature fiber

The manufacture approach of a nonwoven fabric of having irregularity on the front face characterized by carrying out the heat shrink of said heat shrink nature fiber, and making heights forming between each heat welding section of the second fiber layer at the same time it carries out heat welding of both the fiber layer partially.
[Claim 8] Eyes 10-40g/m2 by which the second fiber layer was constituted from a staple fiber with a fineness [of 1.5-10 deniers], and a fiber length of 38-76mm The manufacture approach of the nonwoven fabric according to claim 7 which is a staple fiber web.
[Claim 9] The first fiber layer is the fiber length of 38-76mm and Eyes 10-40g/m2. The manufacture approach of the nonwoven fabric according to claim 7 which is the parallel web of the range.
[Claim 10] As an embossing roll, the area of a top face is 2 0.35-1mm. A small projection is 2 1cm. The manufacture approach of the nonwoven fabric according to claim 7 which forms the nonwoven fabric whose area percentage of occupying on the nonwoven fabric front face of the heat welding section is 10 - 50% using what was arranged per 10-100 pieces.

[Translation done.]

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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
[Section partition] The 5th partition of the 3rd section
[Publication date] February 20, Heisei 13 (2001. 2.20)

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D04H 1/06
A44B 18/00
B32B 5/08
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[Procedure revision]
[Filing Date] May 11, Heisei 12 (2000. 5.11)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] 0004
[Method of Amendment] Modification
[Proposed Amendment]
[0004] However, it is unsuitable to use such female material for a disposable diaper etc. That is, it is because ** is high and generally lacks in flexibility, so the female material which has the structure which the above loop formations projected from woven knitted goods may give the wearer of a diaper sense of incongruity. Moreover, since the manufacturing cost of such female material generally attaches highly, it is not realistic to use such female material in the intense disposable goods of price competition, and it is more rational than the engagement force of a fastener to think the manufacturing cost as important rather.
[Procedure amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] 0016

[Method of Amendment] Modification
[Proposed Amendment]
[0016] Moreover, it sets to said approach and the first fiber layer is the fiber length of 38-76mm and eyes 10 - 40 g/m2. It is desirable that it is the parallel web of the range. Moreover, it sets to said approach and the area of a top face is 2 0.35-1mm as an embossing roll. It is a small projection 1cm 2 It is desirable to form the nonwoven fabric whose area percentage of occupying on the nonwoven fabric front face of the heat welding section is 10 - 50% using the roll arranged per 10-100 pieces. Hereafter, the contents of this invention are explained.
[Procedure amendment 3]
[Document to be Amended] Specification
[Item(s) to be Amended] 0019
[Method of Amendment] Modification
[Proposed Amendment]
[0019] It is desirable to use the fiber which consists of a polymer which contains the ethylene-propylene random copolymer which has fusion peak temperature (Tmdegree C) within the limits of 130<Tm<145 degree C as heat shrink nature fiber whose rate of the maximum heat shrink is at least 50% 70% of the weight or more by this invention. Fusion peak temperature means temperature in case a DSC curve shows a peak price here, when a differential scanning calorimeter (DSC) performs heat-of-fusion measurement of a polymer. A polymer comes to show rubber-elasticity that fusion peak temperature is less than 130 degrees C here, and the card permeability of fiber worsens. On the contrary, if it exceeds 145 degrees C, since the heat shrink nature of fiber becomes usual polypropylene extent, it is not desirable.

[Translation done.]